8. (Amended) The method of Claim 1 wherein the linear isocyanate-terminated polyurethane prepolymer is a reaction product of an organic diisocyanate monomer and a dihydroxypolyester.

10. (Amended) The method of Claim 1 wherein the linear isocyanate-terminated polyurethane prepolymer is prepared by reacting an organic diisocyanate monomer with a polyol, in a mole ratio of organic diisocyanate monomer to polyol ranging from about 1.7:1 to about 12:1.

## REMARKS

In response to the Advisory Action of December 31, 2002, Applicants have amended the claims, which when considered with the following remarks, is deemed to place the present application in condition for allowance. Favorable reconsideration of all pending claims is respectfully requested. Amendments and/or cancellations have been made in the interest of expediting prosecution of this case. Applicants reserve the right to prosecute the same or similar subject matter in this or another application.

Claims 1-16 are pending in this application.

The Examiner refused to enter the Amendment filed November 26, 2002 on the grounds that the proposed deletion of the subject matter from the last two lines of Claim 1 raises new issues that have not been previously considered and the proposed deletion raises the issue of new matter. While not necessarily agreeing with the Examiner, Claim 1 has been amended in a manner to include the subject matter from the last two lines of Claim 1 to put the claim in

condition for allowance or in better condition for appeal, if one becomes necessary. Claims 5, 7, 8 and 10 remain amended as in the Amendment filed November 26, 2002. Applicants have attached herein Appendix A containing a marked-up version of original Claims 1, 5, 7, 8 and 10. Applicants respectfully submit that no new matter has been added to the subject application nor have any new issues been raised by this amendment. Thus, entry and reconsideration of this application is deemed proper as it places the claims in condition for immediate allowance.

The Examiner has rejected Claims 1-16 under the first paragraph of 35 U.S.C. §112 as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, the Examiner alleges that applicants have failed to clearly define exactly what is meant by the recitation "substantially linear isocyanate-terminated polyurethane prepolymer." Although not necessarily agreeing with the Examiner, Applicants have amended Claims 1, 5, 7, 8 and 10 to recite "linear isocyanate-terminated polyurethane prepolymer" to expedite prosecution of this case thus obviating this rejection. Accordingly, withdrawal of the rejection under the first paragraph of 35 U.S.C. §112 is warranted and such is respectfully requested.

The Examiner has rejected Claims 1-16 under the second paragraph of 35 U.S.C. §112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Specifically, the Examiner alleges that it is unclear how "substantially" modifies "linear". Although, not necessarily agreeing with the Examiner,

Applicants have amended Claims 1, 5, 7, 8 and 10 to recite "linear isocyanate-terminated polyurethane prepolymer" to expedite prosecution of this case.

The Examiner also alleges that the use of the term "about" within the language "less than about 250" renders the claim indefinite because the term "about" encompasses values slightly above 250 and therefore it is unclear if the express "less than about 250" actually encompasses values of 250 or slightly above. The indication in the Advisory Action that this rejection is withdrawn in view of the following remarks is noted with appreciation.

In ascertaining whether claims comply with the second paragraph of section 112, a determination is made as to whether the claims set out and circumscribe a particular area with a reasonable degree of precision and particularity. *In re Moore*, 39 F.2d 1232, 169 USPQ 236 (CCPA 1971). The claims should not be considered in a vacuum, "but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing ordinary skill in the art." *Id.* It is submitted that the term "about", although relative, is not indefinite. Applicants further submit that the term "about" as it appears in Claim 1 and in the specification, would be interpreted by one possessing ordinary skill in the art as having the ordinary dictionary meaning, i.e., a diol having a molecular weight below 250 and slightly above 250. As such, it is respectfully submitted that Claims 1-16 set out and circumscribe a particular area with a reasonable degree of precision and particularity. Accordingly, withdrawal of the rejection under the second paragraph of 35 U.S.C. §112 is respectfully requested.

The Examiner has maintained the rejection of Claims 1-16 under 35 U.S.C. §103(a) as being obvious over Okazaki et al. U.S. Patent No. 3,899,623 ("Okazaki") or Koyama et al. U.S. Patent No. 5,436,399 ("Koyama") in view of Gajewski U.S. Patent No. 5,895,689 ("Gajewski '689") or Gajewski U.S. Patent No. 5,895,806 ("Gajewski '806") or Ruprecht et al., "Roll Covering by Rotational Casting with Fast-Reacting PUR Systems", Polyurethanes World Congress 1991 (Sep. 24-26) pp. 478-481 ("Ruprecht").

As pointed out by the Examiner in the Office Action dated July 30, 2002, nowhere does Okazaki or Koyama disclose or suggest a method for coating a flexible substrate employing the step of "rotationally casting to the substrate a coating comprising a polyurethane composition formed from (a) a linear isocyanate-terminated polyurethane prepolymer; and, (b) a curative agent containing a diol having a molecular weight of less than about 250" as presently recited in amended Claim 1.

Rather, both Okazaki and Koyama disclose coating an impregnated sheet or other fibrous material using a polyurethane coating composition formed from substantially linear isocyanate-terminated prepolymer and a diol chain extender, e.g., 1,4-butane diol. However, there is no disclosure of any coating method in both Okazaki and Koyama. This has been acknowledged by the Examiner in the Office Action of July 30, 2002.

It is respectively submitted that Gajewski '689 and Gajewski '806 each fail to cure the deficiencies of Okazaki and Koyama. Specifically, Gajewski '689 and Gajewski '806 likewise fail to disclose or suggest a method for coating a flexible substrate employing the step of rotationally casting to the flexible substrate a polyurethane coating composition formed from (a) a

linear isocyanate terminated polyurethane prepolymer and (b) a curative agent containing a diol having a molecular weight of less than about 250 to provide coated flexible substrates having high flex fatigue properties.

Rather, both Gajewski '689 and Gajewski '806 disclose a rotational casting method for coating cylindrical objects, i.e., a rigid substrate, employing a polyurethane composition obtained from (a) an isocyanate-terminated polyurethane prepolymer that can be either a linear or branched prepolymer and (b) a curative mixture containing, *inter alia*, a polyol curative agent having a molecular weight greater than 250 (e.g., polytetramethylene ether glycol having a molecular weight of 650 (see Example 2 of both Gajewski '689 and Gajewski '806)) or a mixture of a major amount of a polyol having a molecular weight greater than 250 and a minor amount of a polyol having a molecular weight less than 250. Thus, as far as Gajewski '689 and Gajewski '806 are concerned, rotationally casting a polyurethane composition containing a linear or branched isocyanate terminated polyurethane prepolymer and a curative agent containing a diol having a molecular weight of greater than about 250 is equivalent to rotationally casting a polyurethane coating composition formed from a linear isocyanate terminated polyurethane prepolymer and a curative agent containing a diol having a molecular weight of less than about 250. In fact, there is no appreciation in either of Gajewski '689 or Gajewski '806 of any problems in rotationally casting to a flexible substrate a linear or branched isocyanate terminated polyurethane prepolymer and a curative agent containing a diol having a molecular weight greater than 250.

Examples 4-8 and Comparative Examples E-I set forth in Applicants' specification amply demonstrate the superior and unexpected results achieved by rotationally casting a polyurethane composition containing a linear isocyanate-terminated polyurethane prepolymer and a diol curative agent having a molecular weight below about 250. As shown from the examples in Applicants' specification, when comparing Applicants' Examples 4-8 employing the specifically recited polyurethane composition containing a linear isocyanate-terminated polyurethane prepolymer and a diol curative agent having a molecular weight below about 250 in the claimed process (within the scope of the invention) with Comparative Examples E-I employing a linear isocyanate-terminated polyurethane prepolymer and a curative agent containing, *inter alia*, a polyol having a molecular weight greater than 250 (outside the scope of the invention) in the otherwise same process, the polyurethane compositions outside the scope of the invention provided significantly lower flex fatigue values than the polyurethane compositions employed in Examples 4-8.

The results of this data is reproduced below for the Examiner's convenience:

| SAMPLE | STOICHIOMETRY | CURE TEMP. (°C) | SHORE A | TEXUS FLEX. CYCLES |
|---|---|---|---|---|
| Example 4 | 98 | 115 | 85 | 800K |
| Example 5 | 98 | room temp. | 86 | 220K |
| Example 6 | 95 | 70 | 90 | 25K |
| Example 7 | 103 | 70 | 89 | 103K |
| Example 8 | 98 | 115 | 90 | 12K |
| Comp. Ex. E | 95 | 70 | 90 | 3K |
| Comp. Ex. F | 100 | 70 | 89 | 6K |
| Comp. Ex. G | 105 | 70 | 88 | 40K |

As these data show, when employing a polyurethane composition containing a linear isocyanate-terminated polyurethane prepolymer and 1,4-butane diol, i.e., a diol curative agent having a molecular weight less than 250 (within the scope of this invention) of Examples 4-8, resulted in a significantly higher flex fatigue value as compared to a polyurethane composition containing a linear isocyanate-terminated polyether prepolymer and polytetramethylene ether glycol (PTMEG), i.e., a polyol curative agent having a high molecular weight greater than 250 (outside the scope of this invention) of Comparative Examples E-G. For example, when comparing Example 7 with Comparative Example G, both of which utilized relatively similar stoichiometric amounts of prepolymer and curative agent, the polyurethane composition of Example 7 showed a significantly higher flex fatigue value, i.e., 103K vs. 40K. The same holds true when comparing Examples 6 and 8 with Comparative Examples E and F, respectively.

It is also important to note that when rotationally casting the polyurethane compositions of Comparative Example H, which employed the same linear isocyanate-terminated polyurethane prepolymer as in Examples 4 and 5, and Comparative Example I , which employed the same linear isocyanate-terminated polyurethane prepolymer as in Examples 6-8, but both of which employed the high molecular weight polyol curative agent PTMEG, the resulting films provided flex fatigue values that were not measurable, i.e., the resulting films were to soft and therefore inoperable. These results are in no way taught or suggested in the cited primary references or the secondary references (i.e., Gajewski '689 and Gajewski '806). Accordingly, nothing in Gajewski '689 or Gajewski '806 would lead one skilled in the art to look to the disclosures of Gajewski '689 or Gajewski '806 to modify the disclosures of Okazaki or Koyama to arrive at the presently claimed process of rationally casting the specifically recited polyurethane composition on flexible substrates.

Kulp likewise does not cure the deficiencies of Okazaki and Koyama. Specifically, Kulp likewise fails to disclose or suggest a method for coating a flexible substrate employing the step of rotationally casting to the flexible substrate a polyurethane coating composition formed from (a) a linear isocyanate terminated polyurethane prepolymer and (b) a curative agent containing a diol having a molecular weight of less than about 250 to provide coated flexible substrates having high flex fatigue properties.

Rather, Kulp discloses a rotational casting method for coating cylindrical objects useful as rollers and wheels employing a polyurethane elastomer composition formed from an isocyanate-terminated polyurethane prepolymer and amine curative agent containing an

aminobenzoate functionalized polyol in which the polyol possesses a molecular weight greater than 250. Thus, Kulp, like Gajewski '689 and Gajewski '806, has no appreciation of the advantages of achieving high flex fatigue properties employing the specifically recited polyurethane composition in the process of the present invention, as set forth in the present claims. The importance of rotationally casting to a flexible substrate a polyurethane coating composition formed from a linear isocyanate terminated polyurethane prepolymer and a curative agent containing a diol having a molecular weight of less than about 250 compared to a polyurethane coating composition containing a linear or branched isocyanate terminated polyurethane prepolymer and a curative agent containing a diol having a molecular weight of greater than about 250 is amply demonstrated by the results of experimental work presented in the specification (Examples 4-8 vs. Comparative Examples E-I). The advantages of the present invention are discussed above in detail in connection with the rejection based on Gajewski '689 and Gajewski '806 and also serve to evidence the unobviousness of applicants' process of employing a polyurethane coating composition formed from a linear isocyanate terminated polyurethane prepolymer and a curative agent containing a diol having a molecular weight of less than about 250 for rotationally casting the coating composition to a flexible substrate. Accordingly, nothing in Kulp would lead one skilled in the art to look to the disclosure of Kulp to modify the disclosures of Okazaki or Koyama to arrive at the presently claimed process of rationally casting the specifically recited polyurethane composition on flexible substrates.

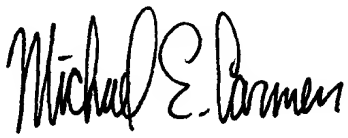
Ruprecht likewise does not cure the deficiencies of Okazaki and Koyama. Specifically, Ruprecht likewise fails to disclose or suggest a method for coating a flexible substrate employing the step of rotationally casting to the flexible substrate a polyurethane coating composition formed from (a) a linear isocyanate terminated polyurethane prepolymer and (b) a curative agent containing a diol having a molecular weight of less than about 250 to provide coated flexible substrates having high flex fatigue properties.

Rather, Ruprecht discloses a rotational casting method for cylindrical objects, e.g., roll coverings, using a fast-reacting polyurethane elastomer formed from an isocyanate-terminated polyurethane prepolymer and curative mixtures containing long-chained polyether polyols, and short-chain extenders having highly reactive hydroxy and amine groups. This disclosure in Ruprecht certainly provides no suggestion, motivation or even a hint of coating a flexible substrate by rotationally a polyurethane composition formed from a linear isocyanate-terminated polyurethane prepolymer and a curative agent containing a diol having a molecular weight less than about 250 to impart improved flex fatigue properties. The advantages of the present invention are discussed above in detail in connection with the rejection based on Gajewski '689 and Gajewski '806 and also serve to evidence the unobviousness of applicants' process of employing a polyurethane coating composition formed from a linear isocyanate terminated polyurethane prepolymer and a curative agent containing a diol having a molecular weight of less than about 250 for rotationally casting the coating composition to a flexible substrate. Nothing in Ruprecht would lead one skilled in the art to look to the disclosure of Ruprecht to modify the disclosure of Okazaki or Koyama and arrive at the presently claimed process.

For the foregoing reasons, since Okazaki or Koyama, alone or in combination with Gajewski '689, Gajewski '806, Kulp or Ruprecht, do not disclose or suggest a method for coating a flexible substrate employing the step of rotationally casting to the flexible substrate a polyurethane coating composition formed from (a) a linear isocyanate terminated polyurethane prepolymer and (b) a curative agent containing a diol having a molecular weight of less than about 250" as presently recited in amended Claim 1, amended Claims 1-16 are believed to be patentable over Okazaki, Koyama, Gajewski '689, Gajewski '806, Kulp and Ruprecht.

For the foregoing reasons, it is submitted that amended Claims 1-16 as presented herein are in condition for immediate allowance. Such early and favorable action is earnestly solicited.

Respectfully submitted,



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APPENDIX A

1. (Amended) A method for coating a flexible substrate which comprises rotationally casting to the substrate a coating comprising a polyurethane composition formed from (a) a [substantially] linear isocyanate-terminated polyurethane prepolymer; and, (b) a curative agent containing a diol having a molecular weight of less than about 250 and, optionally, a secondary aliphatic diamine, wherein the polyurethane composition is formed in the absence of a non-linear isocyanate-terminated polyurethane prepolymer.

5. (Amended) The method of Claim 1 wherein the [substantially] linear isocyanate-terminated polyurethane prepolymer is a reaction product of a polyol and an organic diisocyanate monomer selected from the group consisting of 2,4-toluene diisocyanate, 2,6-toluene diisocyanate, 4,4'-diisocynatodiphenylmethane (MDI), phenylenediisocyanate (PPDI), diphenyl-4,4'-diisocynate, 1,3-xylene diisocyanate, 1,4-xylene diisocyante, 1,6-hexamethylene diisocyanate, 1,3-cyclohexyl diisocyanate, 1,4-cyclohexyl diisocyanate (CHDI), diphenylmethane diisocyanate (H(12)MDI) and isophorone diisocyanate.

7. (Twice Amended) The method of Claim 1 wherein the [substantially] linear isocyanate-terminated polyurethane prepolymer is a reaction product of an organic diisocyanate monomer and a polyol selected from the group consisting of ethylene glycol, diethylene glycol, 1,2-propylene glycol, 1,3-propane diol, 1,4-butylene glycol, polytetramethylene ether glycol (PTMEG), polycarbonate and a dihydroxy polyester.

8. (Amended) The method of Claim 1 wherein the [substantially] linear isocyanate-terminated polyurethane prepolymer is a reaction product of an organic diisocyanate monomer and a dihydroxypolyester.

10. (Amended) The method of Claim 1 wherein the [substantially] linear isocyanate-terminated polyurethane prepolymer is prepared by reacting an organic diisocyanate monomer with a polyol, in a mole ratio of organic diisocyanate monomer to polyol ranging from about 1.7:1 to about 12:1.